CLAIMS

What is claimed is:

1. A method for setting an atrioventricular delay in a cardiac stimulation device, the method comprising:

monitoring for atrial events; and

adjusting an atrioventricular delay until at least a predetermined percentage of ventricular events comprise intrinsic ventricular events.

2. The method of claim 1, wherein monitoring comprises monitoring for intrinsic atrial events.

3. The method of claim 1, wherein monitoring comprises monitoring for stimulated atrial events.

4. The method of claim 1, wherein adjusting an atrioventricular delay comprises adjusting a hysteresis value.

5. The method according to claim 3, further comprising increasing a base stimulation rate to induce delivery of atrial stimulation pulses;

measuring an average atrioventricular conduction time following delivery of atrial stimulation pulses; and

calculating an atrial-ventricular hysteresis based on the measured average atrioventricular conduction time.

6. The method according to claim 2, further comprising decreasing a base stimulation rate to inhibit delivery of atrial stimulation pulses;

measuring an average atrioventricular conduction time following sensing of intrinsic atrial events; and

calculating an atrial-ventricular hysteresis based on the measured average atrioventricular conduction time.

7. The method according to claim 1, further comprising determining an atrioventricular delay on a periodic basis.

8. The method according to claim 4, wherein adjusting the atrial-ventricular hysteresis comprises:

calculating an average atrioventricular conduction time from a plurality of atrioventricular conduction time measurements;

calculating a measure of variability of the atrioventricular conduction time measurements; and

calculating the hysteresis value based on the average atrioventricular conduction time and the measure of variability of the atrioventricular conduction time measurements.

9. A cardiac stimulation device for automatically measuring an atrioventricular conduction time, comprising:

means for monitoring for atrial events;

means for monitoring for intrinsic ventricular events;

means for determining atrioventricular conduction times for a plurality of cardiac cycles;

means for determining, based on the atrioventricular conduction times, a conduction time value by which at least a predetermined percentage of intrinsic ventricular events have occurred; and

means for setting an atrioventricular delay to a value based on the conduction time value.

10. The stimulation device of claim 9, wherein the means for monitoring monitors for intrinsic atrial events.

11. The stimulation device of claim 9, wherein the means for monitoring monitors for stimulated atrial events.

12. The stimulation device according to claim 9, further comprising means for reducing a base stimulation rate to inhibit atrial stimulation; and

means for measuring atrioventricular conduction times following detected intrinsic atrial events and for calculating an atrial-ventricular hysteresis based on the measured atrioventricular conduction times.

13. The stimulation device according to claim 9, further comprising means for increasing a base stimulation rate to induce delivery of atrial stimulation, and means for measuring atrioventricular conduction times following delivery of atrial stimulation pulses, and for calculating an atrial-ventricular hysteresis based on the measured atrioventricular conduction times.

14. A method of measuring atrioventricular conduction times in an implantable cardiac stimulation device, the method comprising:

recording a plurality of conduction times between atrial events and corresponding intrinsic ventricular events;

determining a conduction time value by which at least a predetermined percentage of the intrinsic ventricular events have occurred; and

setting an atrioventricular delay to the conduction time value.

15. The method of claim 14, wherein recording comprises recording a plurality of conduction times between intrinsic atrial events and corresponding intrinsic ventricular events.

16. The method of claim 14, wherein recording comprises recording a plurality of conduction times between stimulated atrial events and corresponding intrinsic ventricular events.

17. The method of claim 14, wherein determining comprises processing the conduction times to generate statistical information relating to the conduction time values.

18. The method of claim 17, wherein the statistical information comprises an average conduction time and a measure of variability of the conduction times.

19. The method of claim 18, wherein the conduction time value is set to a value based on the average conduction time and the measure of variability.

20. The method of claim 14, wherein setting the atrioventricular delay comprises adjusting a hysteresis value to adjust the atrioventricular delay.

21. A method of measuring atrioventricular conduction times in an implantable cardiac stimulation device, the method comprising:

recording a plurality of conduction time values between atrial events and corresponding intrinsic ventricular events;

processing the conduction time values to generate statistical information; and

comparing the statistical information with previous statistical information to determine a change in the statistical information over time.

22. The method of claim 21, wherein recording comprises recording a plurality of conduction times between intrinsic atrial events and corresponding intrinsic ventricular events.

23. The method of claim 21, wherein recording comprises recording a plurality of conduction times between stimulated atrial events and corresponding intrinsic ventricular events.

24. The method of claim 21, wherein processing comprises calculating an average conduction time and a measure of variability of the conduction times.

25. The method of claim 24, further comprising setting an atrioventricular delay to a value based on the average conduction time and the measure of variability.

26. The method of claim 25, wherein setting the atrioventricular delay comprises adjusting a hysteresis value to adjust the atrioventricular delay.

27. The method of claim 21, wherein comparing comprises determining if at least one component of the statistical information varies by more than a preset threshold from the previous statistical information.

28. A method of measuring atrioventricular conduction times in an implantable cardiac stimulation device, the method comprising:

recording a plurality of conduction time values between atrial events and corresponding intrinsic ventricular events;

processing the conduction time values to generate statistical information; and

storing the statistical information in memory for subsequent retrieval.

29. The method of claim 28, wherein recording comprises recording a plurality of conduction times between intrinsic atrial events and corresponding intrinsic ventricular events.

30. The method of claim 28, wherein recording comprises recording a plurality of conduction times between stimulated atrial events and corresponding intrinsic ventricular events.

31. The method of claim 28, wherein processing comprises calculating an average conduction time and a measure of variability of the conduction times.

32. The method of claim 28, further comprising setting an atrioventricular delay to a value based on the average conduction time and the measure of variability.

33. The method of claim 32, wherein setting the atrioventricular delay comprises adjusting a hysteresis value to adjust the atrioventricular delay.

34. A method of measuring atrioventricular conduction times in an implantable cardiac stimulation device, the method comprising:

recording a plurality of conduction time values between atrial events and corresponding intrinsic ventricular events;

processing the conduction time values to generate an estimate of the conduction times;

determining whether the conduction times are excessive; and

setting the hysteresis to zero or a near zero value if the conduction times are excessive.

35. The method of claim 34, wherein recording comprises recording a plurality of conduction times between intrinsic atrial events and corresponding intrinsic ventricular events.

36. The method of claim 34, wherein recording comprises recording a plurality of conduction times between stimulated atrial events and corresponding intrinsic ventricular events.

37. The method of claim 34, wherein processing comprises calculating an average conduction time and a measure of variability of the conduction times.

38. The method of claim 37, further comprising setting an atrioventricular delay to a value based on the average conduction time and the measure of variability if the conduction times are not excessive.

39. The method of claim 38, wherein setting the atrioventricular delay comprises adjusting a hysteresis value to adjust the atrioventricular delay.

40. The method of claim 34, wherein determining comprises calculating an average conduction time value, and comparing the average conduction time value with a threshold value.

41. A cardiac stimulation device comprising:

monitoring circuitry that is operative to monitor for atrial events and for corresponding intrinsic ventricular events;

processing circuitry that is operative to determine a plurality of atrioventricular conduction times for the atrial events and corresponding intrinsic ventricular events;

determining circuitry that is operative to determine a conduction time value by which at least a predetermined percentage of intrinsic ventricular events have occurred; and

control circuitry that is operative to set an atrioventricular delay to a value based on the conduction time value.

42. The stimulation device of claim 41, wherein the monitoring circuitry monitors for intrinsic atrial events.

43. The stimulation device of claim 41, wherein the monitoring circuitry monitors for stimulated atrial events.

44. The stimulation device according to claim 41, wherein the control circuitry is operative to set the atrioventricular delay to the conduction time value.

45. The stimulation device of claim 41 further comprising a processor that comprises at least one of the processing circuitry, determining circuitry and control circuitry.